

Late Glacial to Holocene environmental changes with special reference to salinity reconstructed from shallow water lagoon sediments of the southern Baltic Sea coast

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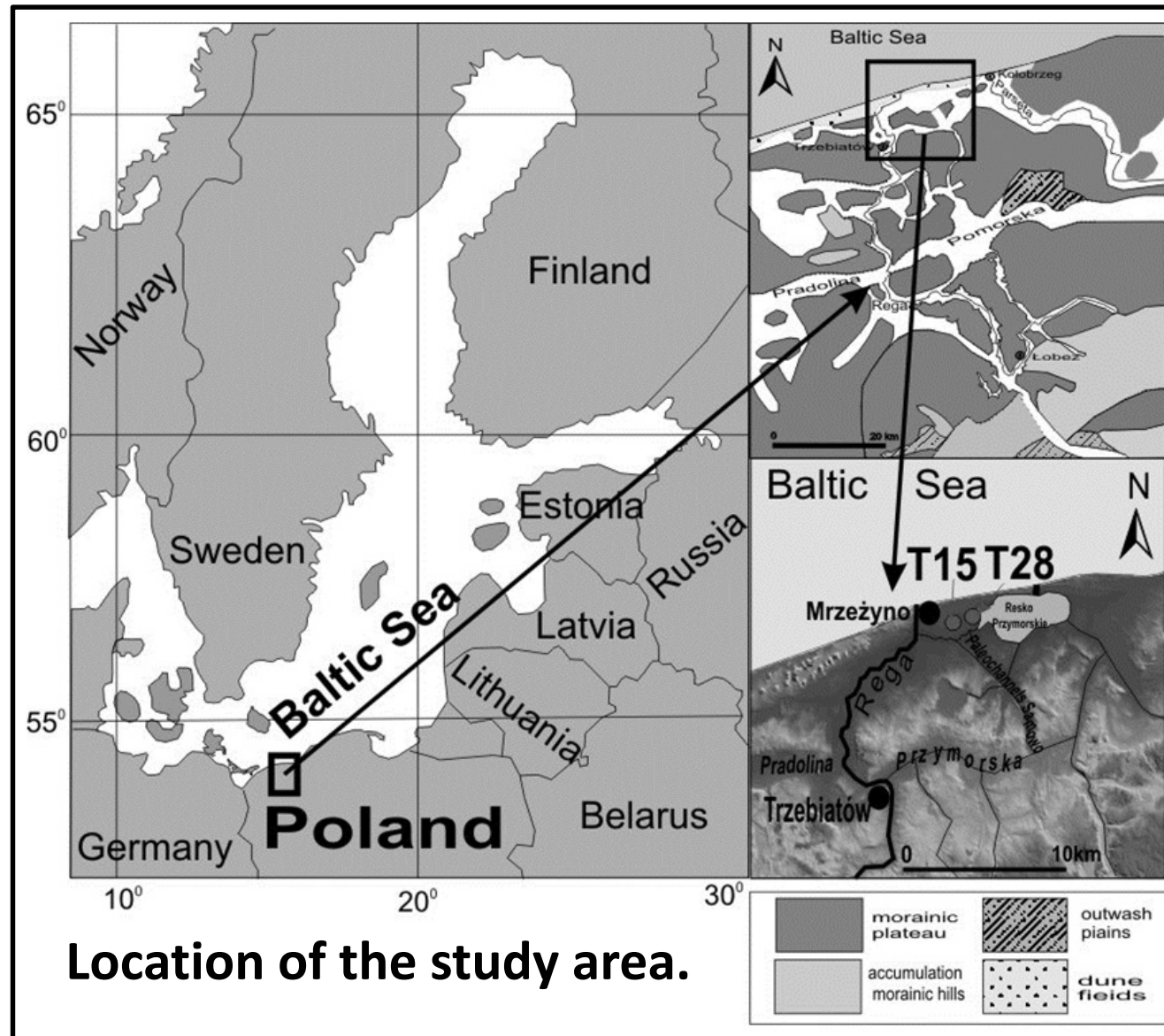
BALTEX

The Baltic Sea Experiment

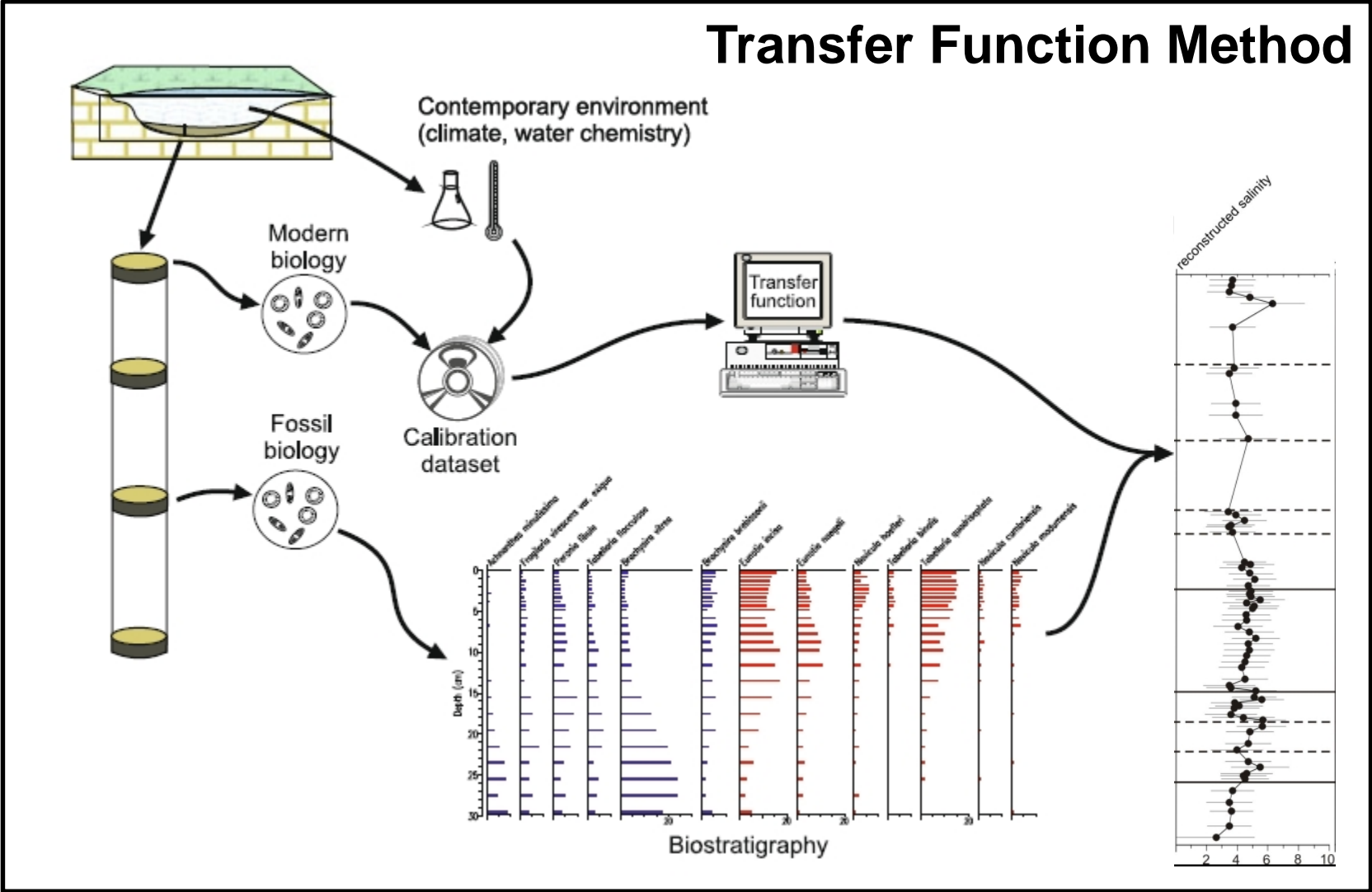


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12-15 May 2014

Material & Methods



Material & Methods

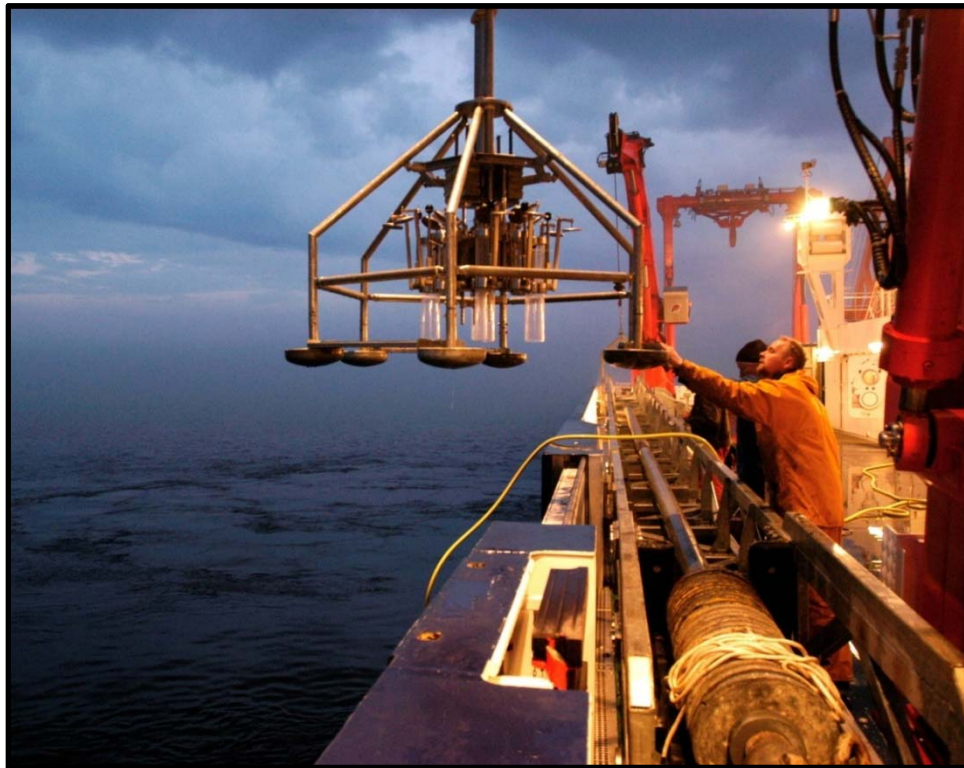


Schematic diagram showing the steps involved in deriving a quantitative reconstruction from biostratigraphical palaeolimnological data using a modern training or calibration data-set (Juggins and Birks 2012)

Material & Methods

Calibration Set FT:

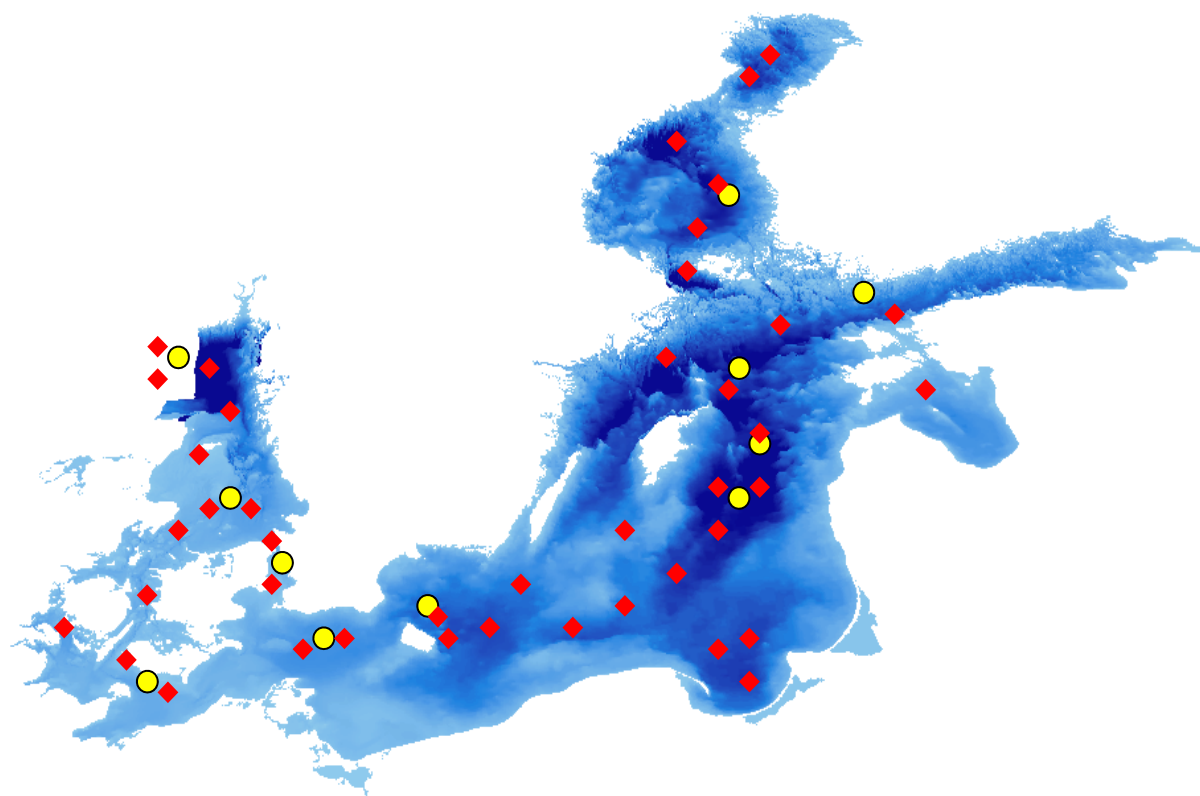
- **233** surface samples
- **90** samples included in calibration set
- Salinity information: average for **2000-2010**, IOW data base



Surface samples were taken with Multicorer (MUC)

Material & Methods

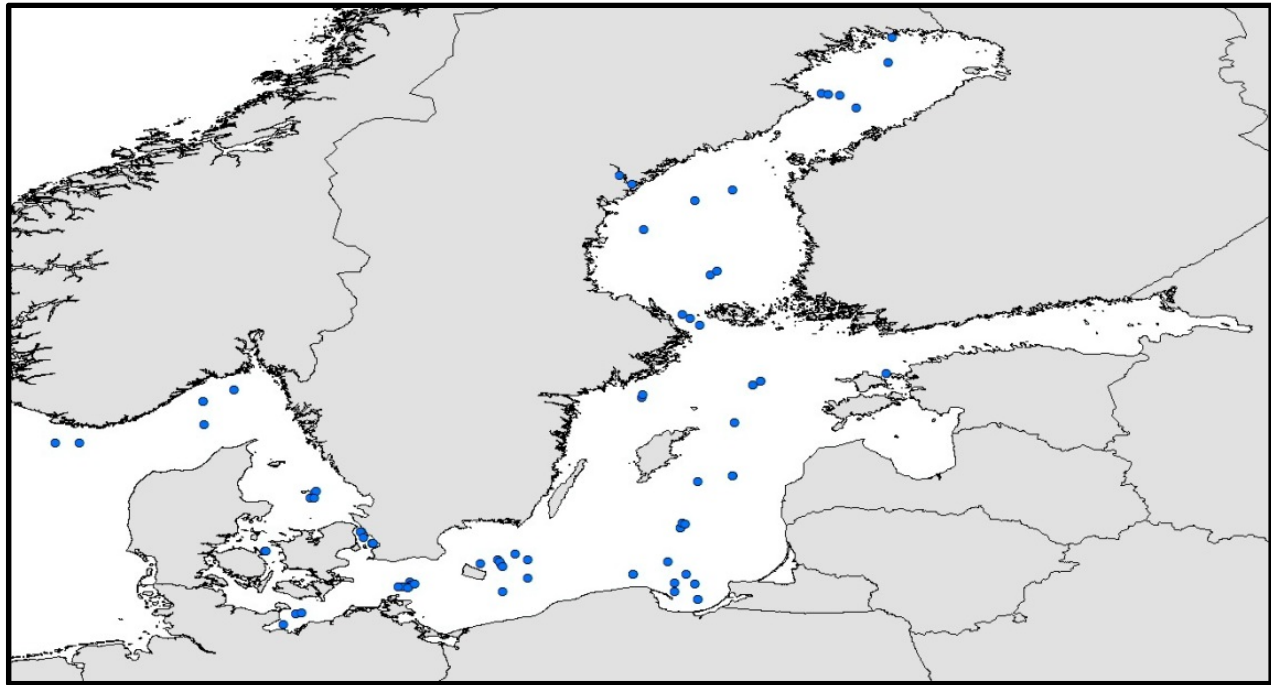
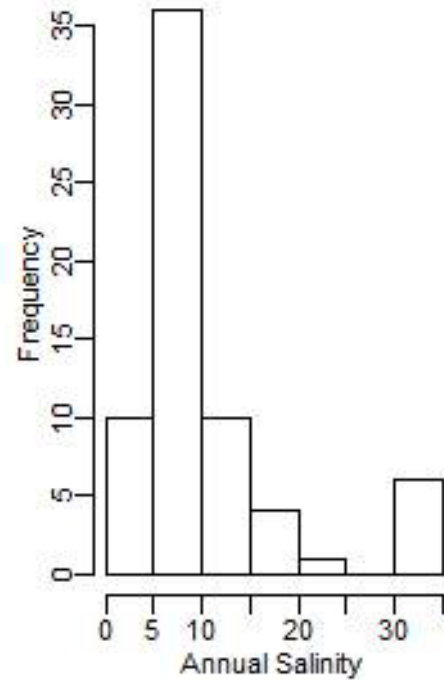
Project INFLOW (2009 - 2011)



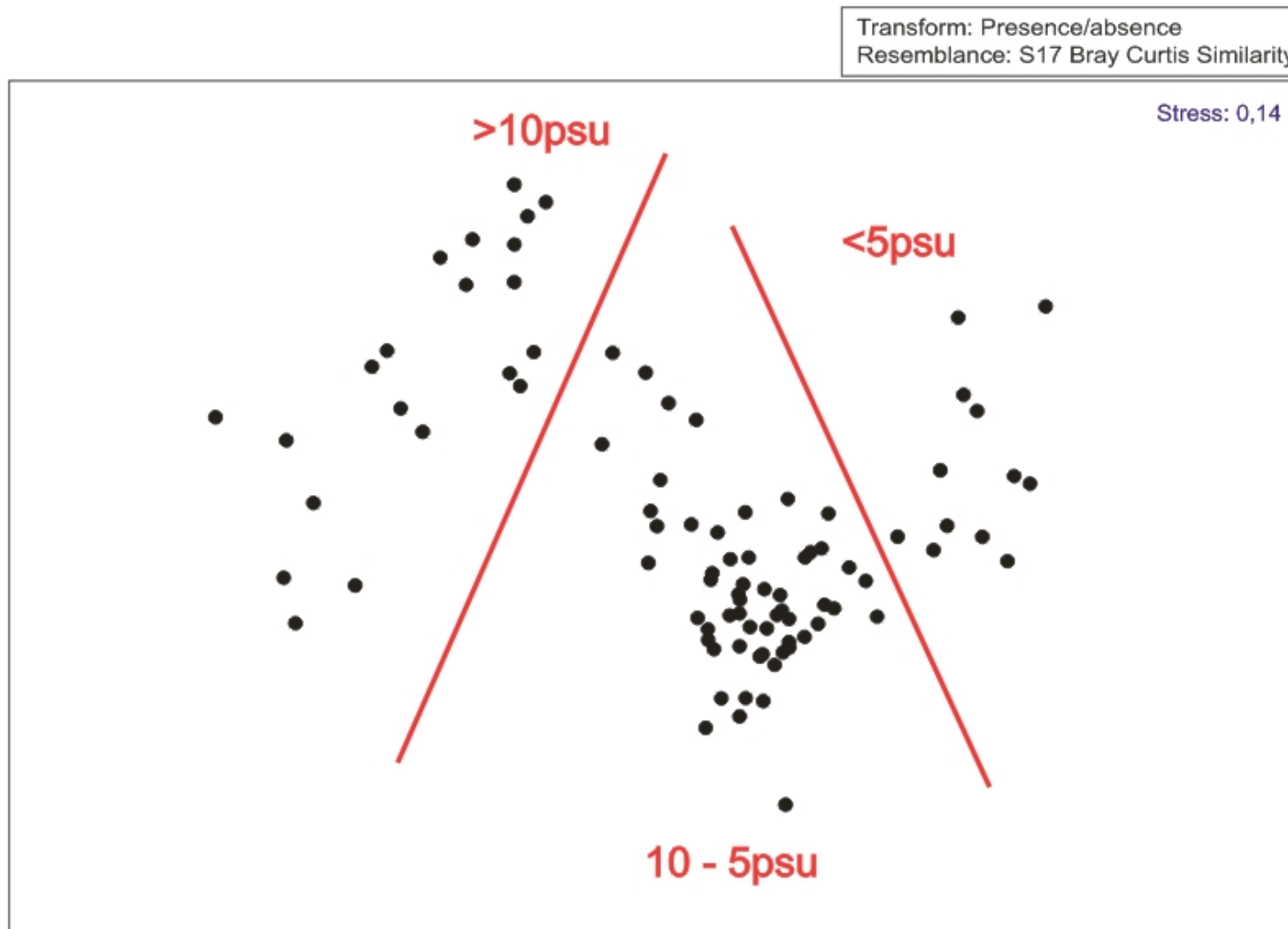
Material & Methods

Surface samples included in final calibration set along salinity gradient in the Baltic Sea.

32,07 - 1,92 psu

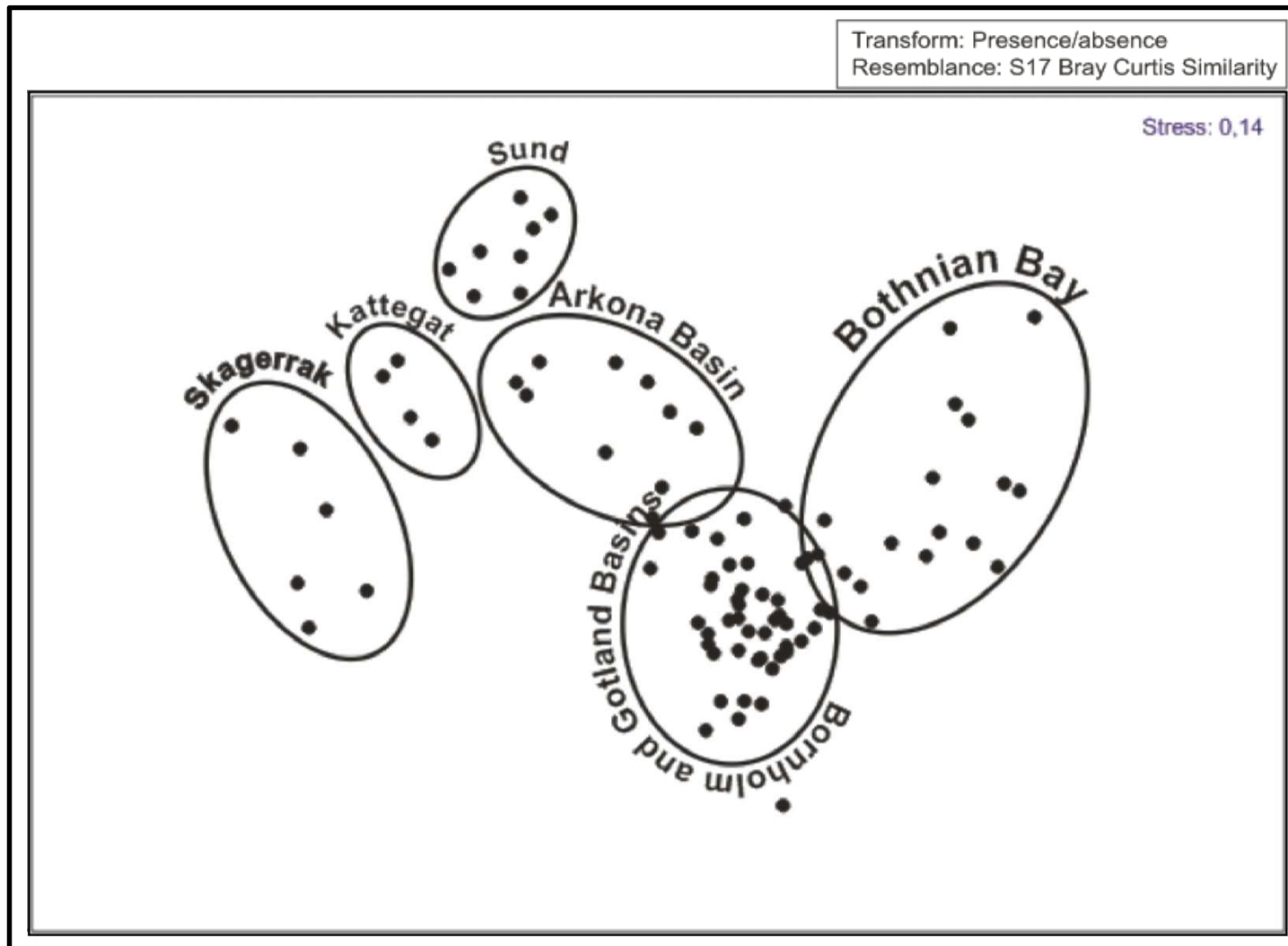


Results



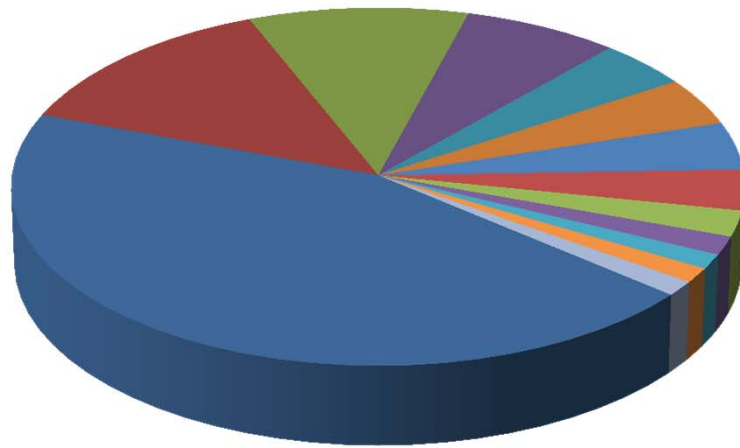
MDS Graph for the similarity of taxonomic structure on surface stations along the Baltic Sea transect, based on number of particular species.

Results



MDS Graph for the similarity of taxonomical structure on surface stations along the Baltic Sea transect, based on number of individual species.

Results



■ *Paralia sulcata*

■ *Cymatosira belgica*

■ *Delphineis surirella*

■ *Roperia tessellata*

■ *Actinoptychus senarius*

■ *Actinocyclus octonarius*

■ *Skeletonema marinoi*

■ *Chaetoceros spp (rs)*

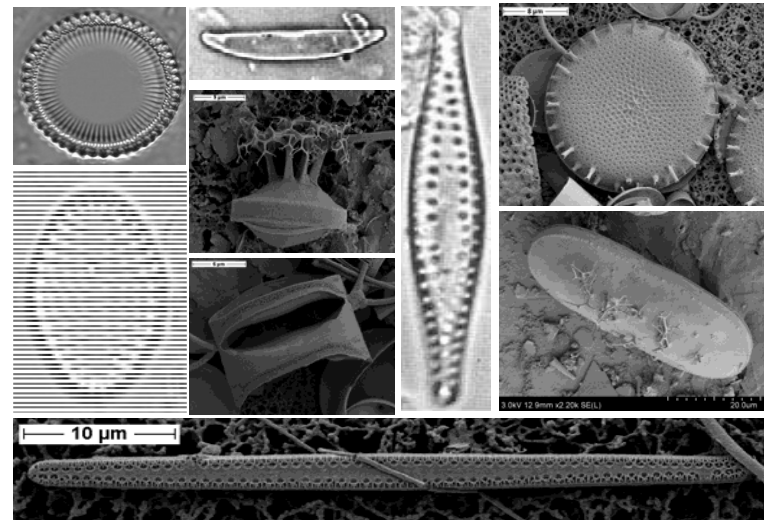
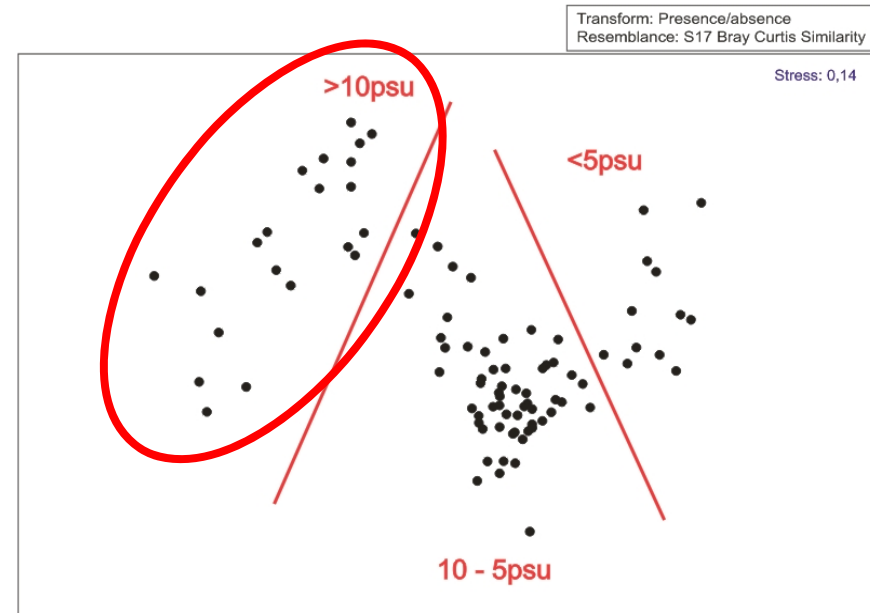
■ *Dithylum brightwelli*

■ *Delphineis surirelloides*

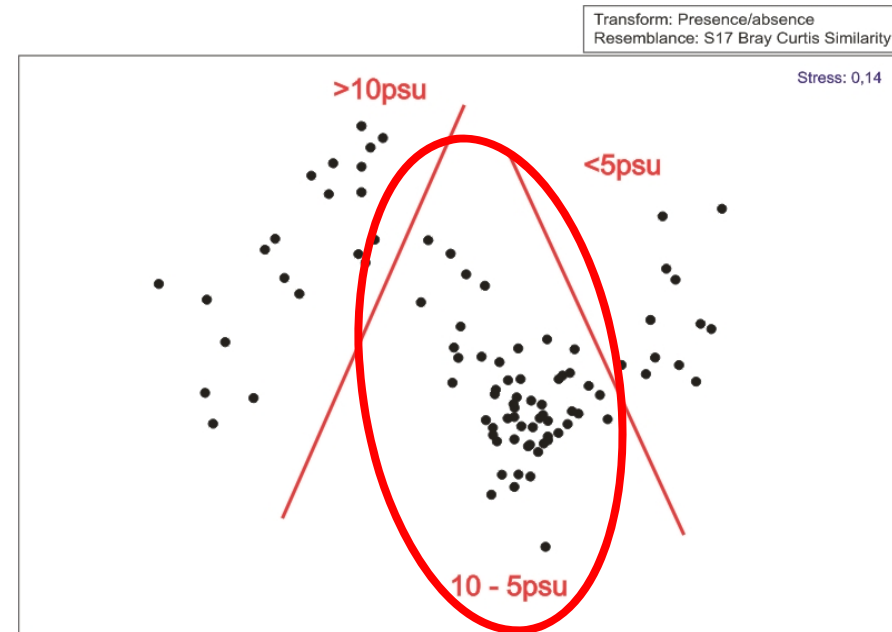
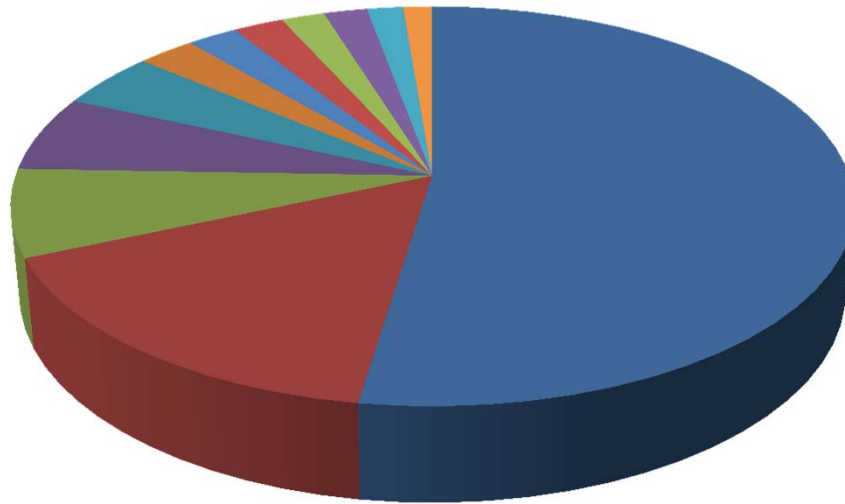
■ *Delphineis minutissima*

■ *Opephora pacifica*

■ *Podosira stelliger*



Results



■ *Thalassiosira levanderi*

■ *Opephora guenter-grassii*

■ *Cyclotella choctawhatcheeana*

■ *Catenula adhaerens*

■ *Fragilaria improbula*

■ *Paralia sulcata*

■ *Skeletonema marinoi*

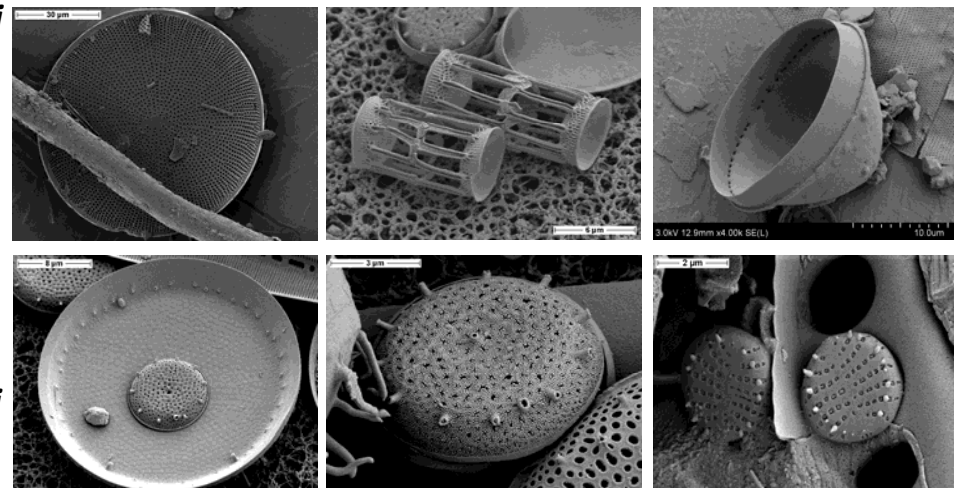
■ *Chaetoceros spp (rs)*

■ *Opephora mutabilis*

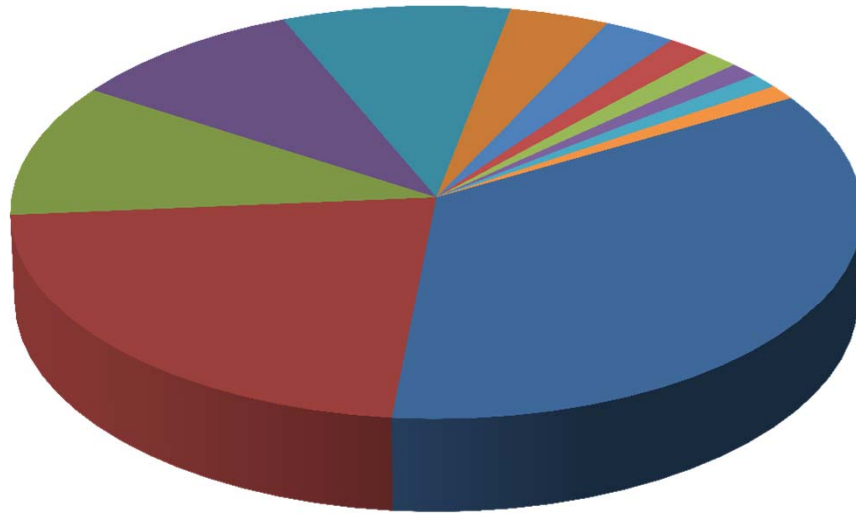
■ *Chaetoceros affinis*

■ *Opephora krumbeinii*

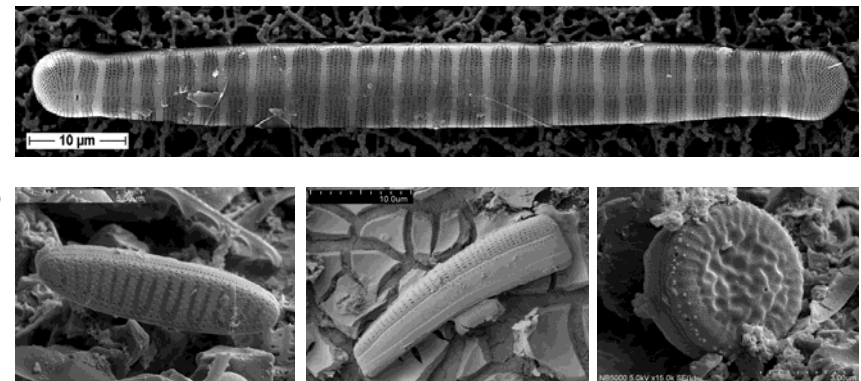
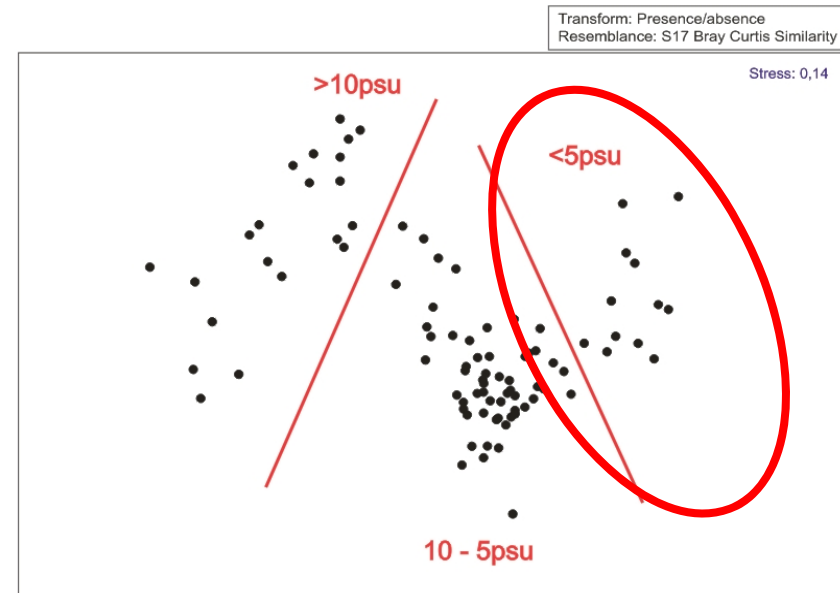
■ *Punctastriata ovalis*



Results



- | | |
|---------------------------------------|--------------------------------------|
| ■ <i>Cyclotella choctawhatcheeana</i> | ■ <i>Fragilariopsis cylindrus</i> |
| ■ <i>Diatoma tenuis</i> | ■ <i>Pauliella taeniata</i> |
| ■ <i>Chaetoceros spp (rs)</i> | ■ <i>Achnantheidium minutissimum</i> |
| ■ <i>Melosira lineata</i> | ■ <i>Thalassiosira baltica</i> |
| ■ <i>Amphora pediculus</i> | ■ <i>Fragilaria vaucheriae</i> |
| ■ <i>Rhoicosphenia abbreviata</i> | ■ <i>Thalassiosira levanderi</i> |

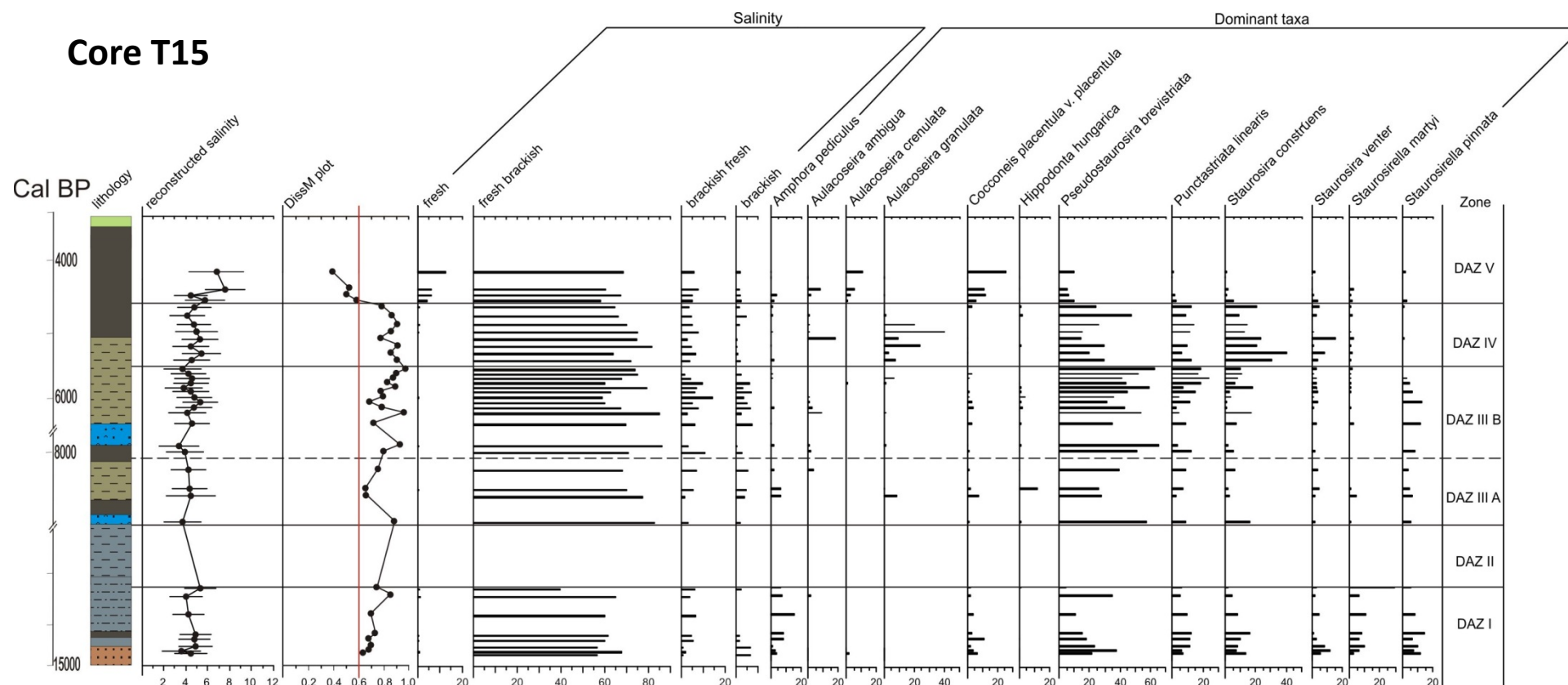


Results

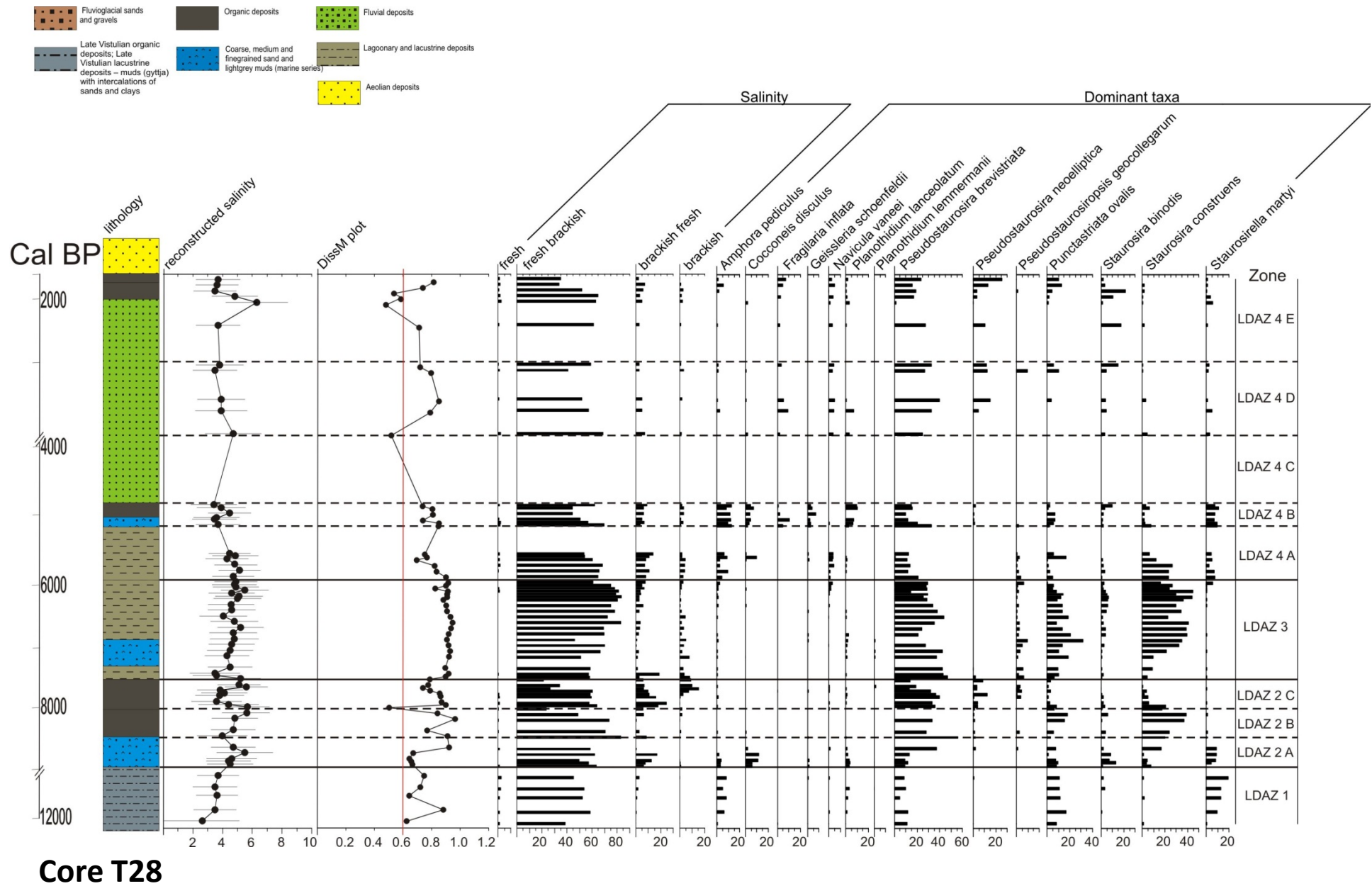
Reconstruction of salinity has been performed with use of Weighted Averaging Partial Least Squares (WAPLS) method (ter Braak i Juggins 1993). Bootstraping has been used as a validation method.

Core	RMSE	R2	Ave_Bias	Max_Bias	Boot_R2	RMSEP
Trz 15	0.832	0.985	0.019	2.46	0.971	1.345
Trz 28					0.972	1.311

Core T15



Results



Conclusions

- The Holocene sediments of the Rega Valley coastal sites contain rich diatom assemblages which are able to be used to produce quantitative salinity reconstructions.
- The results from an isolated coastal lagoon water body shows that long-term salinity trends have been stable for the duration of the mid-Holocene in contrast to previous studies which have found salinity maxima dated to ca. 6500 - 6000 cal. BP and 2200 cal. BP (e.g. Gustaffson and Westman 2002; Emeis et al. 2003).
- This indicates the buffering of the Baltic waters from freshwaters, and demonstrates the importance of terrestrial freshwater input and hydrological processes in determining the long-term salinity stability of the southern Baltic zone.

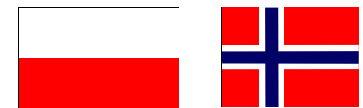
Plans for future



„ClimLink” - Climate forcing factors for marine environmental change during the mid and late Holocene - a link between the eastern Atlantic and the Baltic Sea

Project partners:

Faculty of Geosciences (FGS) University of Szczecin
Bjerknes Centre for Climate Research (BCCR),
Bergen



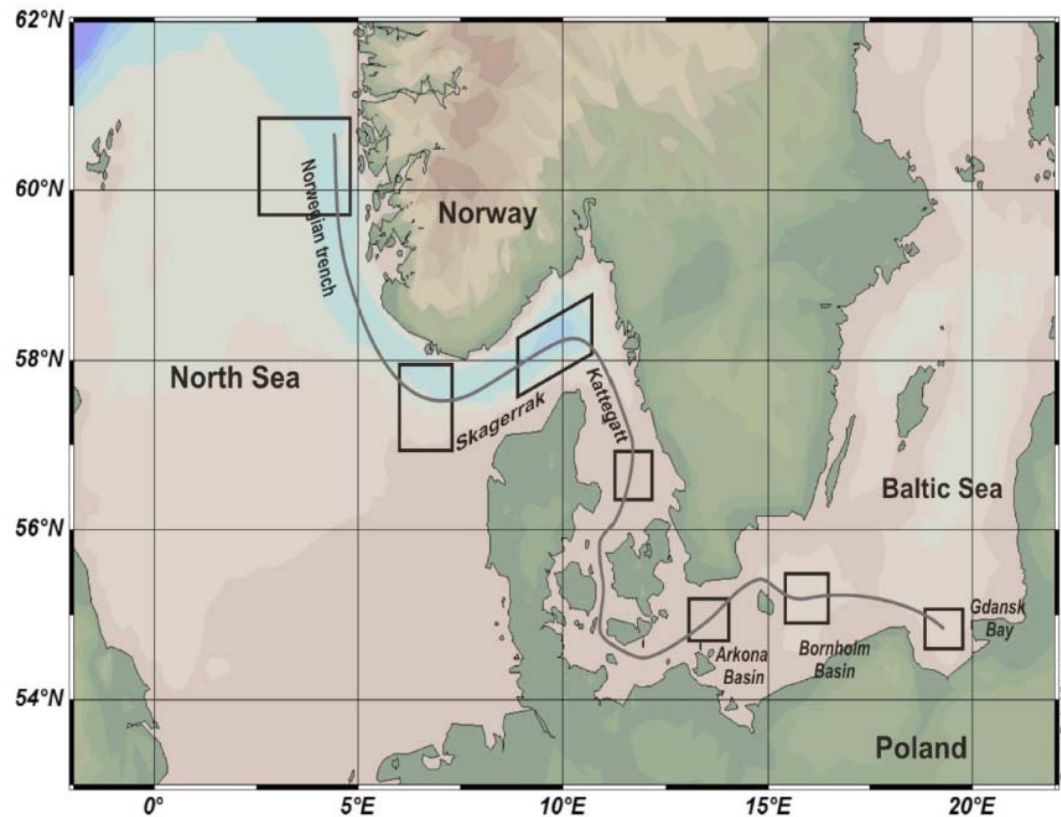
Duration: 1.01.2014 – 31.12.2016

Budget: 3 958 866 PLN = 964 777 EUR

Founding: Norway Grants, Polish-Norwegian Research Programme operated by the National Centre for Research and Development



Plans for future



Development of calibration set for salinity transfer function based on diatom assemblages

New surface sites from Baltic Sea and North Sea will be included in existing TF.

Thank you!

